Low ninety-day re-admission rates after emergency and elective laparoscopic cholecystectomy in a district general hospital

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ABSTRACT

INTRODUCTION Re-admission rate following laparoscopic cholecystectomy is currently defined as within 30 days of the initial operation. This may underestimate the true incidence and financial cost of postoperative morbidity. This study aimed to analyse re-admissions within 90 days of elective and emergency laparoscopic cholecystectomy at a district general hospital, and to compare outcomes to larger teaching centres.

PATIENTS AND METHODS We undertook a retrospective analysis of all patients re-admitted within 90 days of laparoscopic cholecystectomy during an 18-month period (June 2006 to December 2007). Patient characteristics, details of the primary operation, and reasons for re-admission were identified, and a comparison of re-admissions following elective versus emergency procedures was performed.

RESULTS A total of 326 laparoscopic cholecystectomies were performed during the 18-month period (246 elective, 80 emergency). No operations required conversion to an open procedure. Twenty-five patients were re-admitted within 90 days of their operation, of whom only 14 had complications directly related to their surgery (overall re-admission rate 4.3%). There was no statistical difference in re-admission rate or cause of re-admission between elective and emergency procedures. However, the mean time to re-admission following elective procedures was significantly longer (36 days; $P = 0.0003$).

CONCLUSIONS Re-admission rates at our district general hospital are comparable to those reported by larger teaching centres. Current 30-day re-admission data may significantly underestimate morbidity rates and socio-economic cost following elective laparoscopic cholecystectomy.

KEYWORDS

Laparoscopic cholecystectomy – Hospital re-admission – Postoperative complications

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The incidence of cholelithiasis in the UK is 11–22%; approximately 10% of cases are symptomatic.¹ Each year, over 25 000 patients are admitted to English hospitals with acute gallbladder disease, and 15% undergo emergency cholecystectomy.²

In our district general hospital, laparoscopic cholecystectomy is performed both electively for symptomatic gallstone disease, and also as an emergency procedure during an acute admission. Previous studies have reported 30-day re-admission rates of 2–5% following elective laparoscopic cholecystectomy,^{3,4} and 6% following emergency laparoscopic cholecystectomy.⁵

However, in our experience, patients can present with symptoms several weeks after laparoscopic cholecystectomy, and there is little data regarding re-admission rates

after 30 days' postoperatively. In addition, there are very few studies comparing postoperative outcomes following emergency laparoscopic cholecystectomy in district general hospitals and larger teaching units.

Our aim was to determine whether there is a difference in 90-day re-admission rates following either elective or emergency laparoscopic cholecystectomy, and to compare our outcomes at a UK district general hospital with larger teaching centres.

Patients and Methods

The study was conducted at a district general hospital with in eastern England with a catchment population of 180,000.

The local population is mainly affluent and middle-aged, with a low proportion over 60 years old (18%). The incidence of diabetes and obesity is relatively low as compared to national averages (3.3% and 7.2%, respectively: data source, Quality and Outcomes Framework for local PCT).

Our hospital has 266 in-patient beds, with a further 24 day-surgery beds available for elective procedures. There are three consultant upper gastrointestinal surgeons, and dedicated laparoscopic theatres.

All patients who underwent elective or emergency laparoscopic cholecystectomy over a retrospective 18-month period were included in the study (June 2006 to December 2007). This included patients with gallstone pancreatitis, as our policy is to perform emergency laparoscopic cholecystectomy during the index admission. Only those patients deemed unfit for general anaesthetic by a consultant anaesthetist were excluded from the study.

All patients re-admitted within 90-days of their operation during this period were identified and medical notes and computer records analysed to obtain details of their initial operation (American Society of Anesthesiologists [ASA] grading, postoperative problems and duration of initial hospital stay) and re-admission episode (reason for re-admission and length of further hospital stay).

All laparoscopic cholecystectomies were performed by an upper gastrointestinal consultant or experienced middle-grade surgeon under direct supervision. A standard four port technique was used. Antibiotics were not routinely administered unless the gallbladder was breached. The gallbladder was removed via the umbilical port either directly or in a BERT bag (Vernon-Carus Ltd, Lancashire, UK).

All patients underwent pre-operative ultrasound to confirm the diagnosis of gallstone pathology. Acute cholecysti-

tis was defined by the presence of clinical signs of right upper quadrant tenderness, pyrexia, and raised white cell count/inflammatory markers. Selective intra-operative cholangiography was performed where indicated (deranged liver function tests, history of jaundice or pancreatitis, or dilated extra-hepatic ducts with or without intraductal stones on ultrasound).

Follow-up was conducted by telephone clinic 2–4 weeks' postoperatively, which is routine practice within our unit. If patients reported symptoms at this time, they were reviewed by a consultant in out-patient clinic. Wound infections were diagnosed clinically by the presence of pyrexia, cellulitis or wound discharge with raised inflammatory markers. Retained common bile duct stones were confirmed and treated by endoscopic retrograde cholangiography (ERCP). Abdominal pain was diagnosed in the absence of infection or retained stones, with normal imaging studies to exclude a postoperative collection or port-site hernia.

P-values were calculated using an unpaired *t*-test to determine whether observed differences between the elective and emergency groups were significant.

Results

During the 18-month-inclusion period, a total of 326 patients underwent laparoscopic cholecystectomy (246 elective, 80 emergency). All patients admitted with symptomatic gallstone disease underwent emergency surgery, excluding those of ASA grade 4 or 5. All cases were planned as a laparoscopic procedure, and none required conversion to open cholecystectomy.

Twenty-five patients were re-admitted within 90 days of their operation. However, 11 patients were excluded from further analysis as their admission was due to reasons other than postoperative complications (5 gastritis/oesophagitis, 2 urinary tract infections, 1 post-menopausal bleeding, 1 chest pain, 1 elective reversal of ileostomy and 1 planned admission for T-tube removal following an elective procedure with planned exploration of common bile duct).

Of the remaining 14 patients re-admitted, seven were elective cases (2.8%) and seven were emergencies (8.8%). The overall re-admission rate was 4.3%. There was no statistically significant difference in re-admission rate between the two groups (*P* = 0.08; Table 1).

The mean age of re-admitted patients was 54 years for emergencies (range, 34–83 years), and 59 years for elective cases (range, 25–82 years; *P* = 0.64). Mean ASA grade was 2.14 for emergency procedures (range, 1–5) and 2.19 for elective operations (range, 1–4; *P* = 0.94).

Reasons for re-admission are summarised in Table 1, and were categorised as abdominal pain, wound infection and retained common bile duct (CBD) stone. All cases re-admitted with CBD stones had undergone intra-operative

Table 1 Summary of patient re-admissions following elective and emergency laparoscopic cholecystectomy

	Elective (<i>n</i> = 246)	Emergency (<i>n</i> = 80)	<i>P</i> -value
Retained stone	3/7	1/7	0.32
Infection	1/7	3/7	0.32
Abdominal pain	3/7	3/7	1
Total number re-admitted	7/246 (2.8%)	7/80 (8.8%)	0.08
Time to re-admission (days)	36	11	0.0003

There was no significant difference in the cause of re-admission or total number re-admitted between the two groups. Time to re-admission was significantly different between the two groups.

cholangiography (IOC). There was no statistical difference in the incidence of abdominal pain, wound infection or retained CBD stones requiring re-admission following elective or emergency procedures.

Only one patient subsequently re-admitted had experienced an initial postoperative complication. Following her emergency procedure, she experienced persistent abdominal pain which was successfully controlled with oral analgesia. She was re-admitted 30 days later with a further episode of pain. All investigations including imaging and endoscopy were normal, and the pain resolved spontaneously.

The mean time to re-admission was 11 days for emergency cases, but significantly longer at 36 days for elective cholecystectomy ($P = 0.0003$; Table 1). However, there was no difference between groups for gender, age, ASA grade or initial postoperative stay to predict re-admission following either elective or emergency surgery.

The initial hospital stay following both elective and emergency laparoscopic cholecystectomy was short in our hospital (0.3 and 1 days, respectively; range, 0–4 days). Re-admission increased the total hospital stay to 1.3 days and 2.7 days, respectively (range, 0–5 days), although this was not statistically significant.

Discussion

Laparoscopic cholecystectomy is now recognised as a safe and acceptable way of managing acute cholecystitis.^{5,6} Despite this, only 15% of patients with acute cholecystitis in the UK currently undergo emergency cholecystectomy.² Our unit has a policy of performing laparoscopic cholecystectomy during the index admission for symptomatic gallstone disease, including biliary colic, acute cholecystitis and gallstone pancreatitis. A recent study has confirmed the efficacy of emergency cholecystectomy in a UK district hospital setting.⁷

Several studies recommend that early emergency cholecystectomy (within 72–96 h) reduces both intra-operative complication rate and conversion rate to open cholecystectomy.^{8–10} It is also accepted that delayed operative treatment of symptomatic gallstone disease results in a longer total hospital stay^{6,8} and a significant incidence of pre-operative admissions due to biliary complications whilst awaiting definitive surgery, especially in those patients presenting with acute cholecystitis.^{11–15} In addition, 14–16% of patients with acute cholecystitis do not respond to initial conservative treatment, and require emergency cholecystectomy in any case.^{8,15}

Quoted conversion rates for elective laparoscopic cholecystectomy are 0–3%,^{5,4} and for emergency cholecystectomy 7–30%.^{5,8,10} Certain risk factors for conversion have been identified including old age, large gallstones and previous

biliary disease.¹⁴ Open cholecystectomy results in a longer initial hospital stay and convalescence period.¹⁵ However, none of our cases required conversion to an open procedure.

Our approach of performing emergency cholecystectomy has been shown by other studies to result in hospital cost savings and may also increase tariff income.¹⁶ However, it is important to establish whether these benefits are negated by higher re-admission episodes following emergency laparoscopic cholecystectomy, which would increase overall costs for both the hospital and patient.

Morbidity rates following laparoscopic cholecystectomy range from 2.3% for elective cases to 18% for emergencies,^{3,7,8,15,17} and are due mainly to bile leak, wound infection and abdominal pain. There is also evidence that morbidity rates are higher if operations for acute cholecystitis are delayed.⁸ However, postoperative morbidity does not always equate with re-admission, and few studies have investigated patient re-admission following laparoscopic cholecystectomy. It is important to acknowledge that the morbidity quoted in this paper represents only that which required re-admission, which is the focus of this study. It does not take into account those patients who may have suffered more minor postoperative complications which were manageable in the community by their general practitioner.

Re-admissions following surgery incur additional costs both for the hospital due to additional resources required, and also in loss of patient working days. Our re-admission rate following elective laparoscopic cholecystectomy compared favourably with the published literature from major teaching hospitals.³ Our 90-day re-admission rate following emergency cholecystectomy also compared favourably with a 30-day rate of 6% quoted in a recent similar series.⁵ Importantly, we found no significant difference in re-admission rates following elective compared to emergency cholecystectomy.

Of note, 21.4% (3/14) of re-admissions following laparoscopic cholecystectomy occurred more than 30 days following the original operation, and would not traditionally be included in reported data. The mean time to re-admission was 36 days for elective patients. Therefore, the socio-economic cost of postoperative complications may be higher than realised on the current basis of reporting 30-day re-admission rates.

Study limitations

One limitation of our study is small sample size due to the low numbers of patients re-admitted. Although we routinely perform emergency laparoscopic cholecystectomy for gallstone pancreatitis, none of these patients required re-admission during the study period. We will continue to audit re-admission rates, as differences following elective and emergency laparoscopic cholecystectomy may become apparent with larger numbers of patients.

Identifying the reasons for re-admission highlights areas for improvement

Adequate postoperative analgesia regimens must be in place alongside patient education regarding postoperative pain. The non-significant trend towards increased infection rates in emergency cases may be related to the underlying pathology (acute cholecystitis versus biliary colic), but may also be due to underlying co-morbidities such as diabetes and obesity. None of the patients re-admitted in our study were diabetic, and only one was obese (body mass index, 38 kg/m²), reflecting the low incidence of these conditions in our local population. This patient was re-admitted due to abdominal pain, not wound infection. Infection risk may be minimised by appropriate use of antibiotics and by use of a bag to remove infected gallbladders.

Regarding the presence of residual CBD stones despite IOC, there are a number of possible explanations: (i) small stones may be difficult to diagnose; (ii) they may be mistaken for bubbles of air introduced during cannulation or from the syringe (although this should be discounted on repeat contrast injection); (iii) the anatomy may be anomalous; and (iv) the operator may be inexperienced in performing and/or interpreting cholangiograms. A high index of suspicion is, therefore, required, and postoperative ERCP should be requested if stones are thought to be present. From a clinical perspective, it is well recognised that the majority of small stones will pass spontaneously and not, therefore, require ERCP. Interpretation can be improved by appropriate training and experience, but published series acknowledge a false negative rate of 0.9–1.9%.^{18,19} All surgeons performing IOC in our hospital have been fully trained in cholangiography and have a low threshold for seeking senior advice if necessary. One further possibility is the presence of small stones or debris in the cystic duct stump (which can sometimes run a long or tortuous path), which are not always seen at time of surgery and may not be dislodged by the contrast. These can migrate into the common bile duct at any time after cholecystectomy and require re-admission and treatment.

Conclusions

This study has demonstrated that low 90-day re-admission rates after laparoscopic cholecystectomy are possible in a district general hospital with high-volume workloads. This low re-admission rate can be achieved for both elective and emergency cases.

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